

**ASSESSMENT OF FAILURE RATE OF TELEVISION****Adebayo A. A.***

Department of Electrical/ Electronic Engineering, School of Engineering, Federal Polytechnic, Ado Ekiti. Nigeria.

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Corresponding Author*Adebayo A. A.**

Department of Electrical/
Electronic Engineering,
School of Engineering,
Federal Polytechnic, Ado
Ekiti. Nigeria.

ABSTRACT

Television is an equipment that is found in almost all homes. Its role within the household cannot be over emphasized. Failures of this equipment often occur and this gives the users a lot of concern because of their great expectation from it. Television comes in different brands and display technology. This study takes a look at the failure rate of the different kinds of television by display technology and brand in order

to compare the failure rate of these technologies and determine which of the technology has a low failure rate. It was discovered that there is no much difference in failure rates of television in terms of brand but that there exists when the display technology is considered and that, of the three television technologies considered, the CRT has the least failure rates.

KEYWORDS: Failure rate, television, equipment, CRT, LCD, Plasma.

INTRODUCTION

Equipment reliability is a very strong determinant of our day to day activities. Adebayo(2015) asserted this that all users of equipment do not want to replace them until they have been convinced that they have enjoyed the useful life of such equipment. Household equipment are equipment that are used within the household, examples of which is refridgerators, radio set, DVD, television set to mention a few (Adebayo, 2015). One of the equipment that is found in almost every home is the television. There is virtually no home one gets to that one will not see the television.

According to Williams (1975), television is often said to have altered our world. Television is very important to all households because through it what is going on in ones environment and the world at large is known. They are not only heard (as in the case of the radio set) but are accompanied with pictures and so everybody desires to have at least a set within their household. Relaxation is very essential to human beings after a hard day's work and to achieve this the television plays a very serious role. Every individual within a household derive satisfaction through television. Over the years the display technology of television has evolved with time such that today there are not only the cathode ray tube(CRT) television but we also have the plasma, liquid crystal display (LCD), light emitting diode (LED), organic light emitting diode (OLED) and so on used for display. As a result of this advances in technology, this display unit now constitute a great change in the life expectancy of the television set.

Oroge(1991) said that the life expectancy of television is 7 to 10 years, based on 2000 hours per year but today it is discovered that this is not so. Failure rates of this equipment has been found to have greatly changed, thus the life expectancy of the television cannot be said to still be the same. The failure rate of an equipment is the number of failures occurring per unit time while an item is said to have failed when it no longer meets satisfaction, it becomes a threat to the user or when it no longer works at all (Oroge, 1991).

Wang and Chu (2010) pursuit that the calculation of mean time between failures for an LCD panel is an important task because it can offer customers' information about the product's reliability life.

As a result of advances, their exist different brands of televison and definitely this also has effect on the life expectancy of the television set and its failure rates also differ. Examples of the different brands of television are, sony, panasonic, sharp, LG, samsung to mention but a few.

The objective of this work is to examine the failure rates of television set putting into consideration that their exists different display technology and brands.

MATERIALS AND METHODS

For this work, different types of television were studied using brands of Samsung, Sony, LG, Panasonic and Sharp. Their failure rate was studied over a period of one year through the

responses obtained from respondents to the questionnaires that were used for this study. A total of 1000 questionnaires were administered out of which 912 was returned making a 91% of responses. The hypotheses set are.

H_0 : the failure rates of the various brands are the same irrespective of display technology.

H_1 : the failure rates are not the same.

Analysis of variance (ANOVA) was used to test the validity of the hypotheses at 95% confidence level.

Failure rates is determined by.

$$\lambda(t) = \frac{1}{N_s} \times \frac{dN_f}{dt} \quad (1)$$

Where

$\lambda(t)$ = failure rate

N_s = number of successes

N_f = number of failures

dt = time

Analysis of Variance (ANOVA) is a method for comparing the means of several populations. ANOVA compares the variation among groups with the variation within groups and determines whether any of the means are significantly different from each other (Tyrrell, 2009; Shayib, 2013).

RESULTS AND DISCUSSION

Tables 1, 2 and 3 shows the failure rates of the different display technologies and different brands of television used for this study over the period of one year.

Table 1: Failure rates of CRT Television brands.

Month	Sony	Panasonic	Sharp	LG	Samsung
January	2.86	1.51	3.01	4.93	2.92
February	3.07	1.58	3.04	5.98	3.16
March	2.58	1.48	2.86	5.26	2.89
April	2.79	1.39	2.53	5.32	2.85
May	2.82	1.56	2.65	5.44	2.69
June	2.74	1.43	2.79	5.36	2.63
July	2.38	1.49	2.58	5.34	2.58
August	2.43	1.47	2.90	5.50	2.82
September	2.38	1.46	2.60	5.25	3.00
October	2.34	0.68	2.82	5.13	2.73
November	2.34	1.51	2.43	5.42	2.89
December	2.42	1.45	2.38	4.76	2.76

Table 2: Failure rates of LCD Television brands.

Month	Sony	Panasonic	Sharp	LG	Samsung
January	3.45	2.90	4.09	6.02	4.17
February	5.19	3.33	4.76	7.74	4.55
March	4.54	3.11	4.13	6.30	4.03
April	4.81	2.88	4.36	6.74	4.11
May	4.06	2.78	3.88	6.88	3.91
June	3.76	2.92	4.04	7.04	4.39
July	3.23	2.22	4.10	6.67	4.42
August	3.62	2.22	4.10	6.67	4.42
September	3.83	4.21	4.21	7.28	4.15
October	3.84	4.15	4.15	7.08	3.78
November	3.92	2.54	4.08	7.07	4.42
December	3.44	2.77	3.98	6.71	4.01

Table 3: Failure rates of Plasma Television.

Month	Sony	Panasonic	Sharp	LG	Samsung
January	4.50	3.59	4.79	10.70	6.76
February	3.38	5.67	4.49	10.82	7.66
March	4.01	4.06	4.42	10.50	8.35
April	4.36	5.57	5.81	14.03	5.89
May	5.51	1.67	2.58	10.86	9.64
June	3.50	2.72	1.47	8.47	9.08
July	4.37	2.98	3.11	10.91	7.90
August	4.70	2.27	2.82	8.51	8.32
September	4.85	1.79	4.31	11.18	7.60
October	2.66	2.10	4.02	11.10	1.61
November	4.17	2.39	4.64	11.04	4.39
December	3.05	1.45	5.28	10.65	3.82

The result of the analysis of variance of the different brands and technologies is presented in table 4.

Table 4: Analysis of variance (ANOVA) table.

Source square	Sum of freedom	Degree of freedom	Mean of	Fratio	Ftable
Treatment	10.0	4	2.5	3.7526	$F_{0.05}(4,8)=3.8$
Block	27.07	2	13.53	20.3092	$F_{0.05}(2,18)=4.5$
Error	5.33	8	0.6662		
Total	42.4	14			

From the ANOVA table, it is evident that the Null hypothesis holds for treatment sum, but is rejected for block sum. The implication of this is that there is no significant difference in the failure rate of all TV brands, but there is in the failure rate of all TV display technologies, at 95% confidence level. As a result, we can conclude that there is no significant difference in

the failure rates of TV while considering brands but that there is significant difference while considering display technologies at 95% confidence level. From the obtained result, brand does not affect TV failure rate as much as the display technology and the CRT is the TV display technology with least failure rate.

CONCLUSION

The ANOVA result shows that display technology has a key role to play in the life expectancy of television sets and therefore must be put into consideration in buying a television set. No matter the brand that one set out for in purchasing it does not really pose a threat but great consideration must be put when picking the display technology.

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